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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/804,712

03/18/2004

Rafael Camarota

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02/06/2007

TOWNSEND AND TOWNSEND AND CREW LLP/ 015114

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EXAMINER

TRA, ANH QUAN

ART UNIT

PAPER NUMBER

2816

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
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3 MONTHS

02/06/2007

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

<b>Office Action Summary</b>	<b>Application No.</b>		<b>Applicant(s)</b>	
	10/804,712		CAMAROTA ET AL.	
	<b>Examiner</b>		<b>Art Unit</b>	
	Quan Tra		2816	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 18 December 2006.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-31 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-31 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

### DETAILED ACTION

This office action is in response to the amendment filed 12/18/06. The rejection in previous office action is maintained.

#### ***Claim Rejections - 35 USC § 103***

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Miyanaga et al. (USP 5514893) in view of Verhaege et al. (USP 6529359).

As to claim 1, Miyanaga et al.'s figure 1 shows a electronic system comprising: a first integrated circuit comprising: an input buffer (6, 7) coupled between a first supply terminal and a second supply terminal and having an input directly connected to a pad (1); and a clamp diode (2) coupled between the pad and the first supply terminal. Thus, figure 1 shows all elements of the claim except for a detail of a driver circuit, not shown, that providing driving signal to pad 1. However, Verhaege et al.'s figure 1 shows a driver circuit with ESD protection. Therefore, it would have been obvious to one having ordinary skill in the art to use Verhaege et al.'s driver circuit to driver Miyanaga et al.'s circuit figure 1 for the purpose of saving cost. Thus, the modified Miyanaga et al.'s figure 1 further shows a resistor (Verhaege et al.'s Rout) having a first terminal coupled to the pad, and a second terminal coupled to receive an input signal.

As to claim 2, the modified Miyanaga et al.'s figure 1 shows a second integrated circuit (Verhaege et al.'s 20, 22, 30, 38, 44, 34) coupled to the second terminal of the resistor and configured to provide the input signal.

As to claim 3, Miyanaga et al.'s figure 1 shows that the clamp diode has an anode and a cathode, the anode is coupled to the pad and the cathode is coupled to the first supply terminal.

As to claim 4, Miyanaga et al.'s figure 1 shows that the first supply terminal receives a positive supply voltage, and the second supply voltage receives a ground supply.

As to claim 5, Miyanaga et al.'s figure 1 shows a pull-up output device (4) coupled between the first supply terminal and the pad; and a pull-down output device coupled between the pad and the second supply voltage terminal.

As to claim 6, Miyanaga et al.'s figure 1 shows that the pull-up device has a gate coupled to a first predriver circuit (8), and the pull-down device has a gate coupled to a second predriver circuit (9).

As to claim 7, the modified Miyanaga et al.'s figure 1 fails to show logic gate coupled to drive the predriver. However, it is notoriously well known in the art buffer circuit, such as inverter, is for isolating and shaping signal. Therefore, it would have been obvious to one having ordinary skill in the art to use buffer circuit, such as inverter, to driver the predirvers 8 and 9 for the purpose of buffering their inputs signals.

3. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Miyanaga et al. (USP 5514893) in view of Verhaege et al. (USP 6529359) and Toyashima (US 20010017755).

The modified Miyanaga et al.'s figure 1 shows all limitations of the claim except for a switch coupled between the pad and the clamp diode. However, Toyashima's figure 2 shows a circuit having switch F1 coupled between pad 10 and clamp diode D1 to remove the clamp circuit when circuit operates at high speed. Therefore, it would have been obvious to one having ordinary skill in the art to add switches between Miyanaga et al.'s input pad and the diodes for the purpose of capable of increasing the circuit speed.

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4. Claims 9-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Miyanaga et al. (USP 5514893) in view of Verhaege et al. (USP 6529359) and Kwon et al. (US 20020163768).

As to claim 9, the modified Miyanaga et al.'s figure 1 shows all limitations of the claim except for a series of clamp diodes coupled between the pad and the second supply terminal. However, Kwon's figure 4 shows a plurality of clamp diodes (D41-D4n) coupled between pad 210 and second power supply Vss. Therefore, it would have been obvious to one having ordinary skill in the art to employ Kwon's teaching by adding plurality of clamp diodes (D41-D4n) connected between Miyanaga's pad and the second power supply for the purpose of further protecting the internal circuit.

As to claim 10, the modified Miyanaga et al.'s figure 1 shows that the series of clamp diodes comprises four diodes.

As to claim 11, the modified Miyanaga et al.'s figure 1 shows a second integrated circuit (Verhaege et al.'s 14, 12) coupled to the second terminal of the resistor and configured to provide the input signal.

As to claim 12, the modified Miyanaga et al.'s figure 1 shows that each of the clamp diodes in the series of clamp diodes has an anode and a cathode, the anode of one of the clamp diodes in the series of clamp diodes is coupled to the pad, and the cathode of one of the clamp diodes in the series of clamp diodes is coupled to the second supply terminal.

As to claim 13, Miyanaga et al.'s figure 1 shows that the first supply terminal receives a positive supply voltage, and the second supply voltage receives a ground supply.

As to claim 14, Miyanaga et al.'s figure 1 shows that the integrated circuit further comprises a pull-up output device (4) coupled between the first supply terminal and the pad; and a pull-down output device (5) coupled between the pad and the second supply terminal.

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As to claim 15, Miyanaga et al.'s figure 1 shows that the pull-up device has a gate coupled to a first predriver circuit (8), and the pull-down device has a gate coupled to a second predriver circuit (9).

As to claim 16, the modified Miyanaga et al.'s figure 1 fails to show logic gate coupled to drive the predriver. However, it is notoriously well known in the art buffer circuit, such as inverter, is for isolating and shaping signal. Therefore, it would have been obvious to one having ordinary skill in the art to use buffer circuit, such as inverter, to driver the predirvers 8 and 9 for the purpose of buffering their inputs signals.

5. Claims 17-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Miyanaga et al. (USP 5514893) in view of Verhaege et al. (USP 6529359) and Toyashima (US 20010017755) and Sher (USP 6417721).

As to claim 17, the modified Miyanaga et al.'s figure 1 shows all elements of the claims except for the switch is a transistor (see the rejection of claim 8). However, Sher's figures 2A-2F shows that transistor and fuse are type of switches. One skill in the art would have recognized that the connection of fuse is not reversible if opened, and the connection of transistor is reversible if opened/closed. Therefore, it would have been obvious to one having ordinary skill in the art to use transistor as a switch between Miyanaga et al.'s pad and diode for the purpose of reversible turning on/off the switch.

As to claim 18, Miyanaga et al.'s figure 1 shows that the resistor is further coupled to a pad.

As to claim 19, Miyanaga et al.'s figure 1 shows that clamp circuit comprises one diode (2) having an anode and a cathode, the anode coupled to the input of the buffer and the cathode couple the first supply terminal.

As to claim 20, the modified Miyanaga et al.'s figure 1 fails to show that the diode comprises plurality of diodes connected in series. However, it is notoriously well known in the art that the number of clamp diodes determined the clamp threshold level. it would have been obvious to one having ordinary skill in the art to use plurality of series connected clamp diodes for Miyanaga et al.'s diode (2) for the purpose of increasing the clamp threshold level (further see the previously cited JP- 06178445).

As to claim 21, the modified Miyanaga et al.'s figure 1 shows an output driver comprising: a pull-up device (4) coupled between the first supply terminal and the input of the buffer; and a pull-down device (5) coupled between the input of the buffer and the second supply terminal.

As to claim 22, the modified Miyanaga et al.'s figure 1 shows that the switch transistor having gate coupled to received the first signal (inherent).

As to claim 23, the modified Miyanaga et al.'s figure 1 shows that the integrated circuit further comprises a transistor in series with the clamp diode, the transistor having a gate couple to receive a control signal (see the rejection of claim 17).

6. Claims 24 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Miyanaga et al. (USP 5514893) in view of Verhaege et al. (USP 6529359) and Toyashima (US 20010017755) and Sher (USP 6417721) and Grugett (USP 5767733).

As to claim 24, the modified Miyanaga et al.'s figure 1 shows a first transistor in series with the clamp diode (see the rejection of claim 17), the transistor having a gate coupled to receive a control signal; and a second transistor (4) coupled between the pad and the first supply terminal. The modified Miyanaga et al.'s figure 1 fails to show that the clamp diode is a drain-to-bulk diode of the second transistor. However, Grugett's figure 1 shows that the bulk of transistor is connected it source in order to reduce leakage current. Therefore, it would have

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been obvious to one having ordinary skill in the art to connect the bulk of Miyanaga et al.'s transistors respectively to their sources for the purpose of reducing leakage current.

As to claim 25, the modified Miyanaga et al.'s figure 1 shows all elements of the claim except for a first and second transistors respectively connected between the bulk of the pullup transistor and its source and drain. However, Gugett's figure 4 and 6 show transistors (94, 96) respectively coupled between the bulk of transistor 90 and its drain and source for the purpose of reducing the resistance of transistor 90, thereby increasing the speed. Therefore, it would have been obvious to one having ordinary skill in the art to employ Gugett's teaching to Miyanaga's pull-up and pull-down transistors (4, 5) for the purpose of increasing the speed.

7. Claim 27 is rejected under 35 U.S.C. 103(a) as being unpatentable over Fugate et al. (USP 6525594) in view of Zhu et al. (USP 5933047).

Fugate et al.'s figure 2 shows an electronic system comprising: an integrated circuit comprising: an output buffer comprising a pull-up transistor (22) coupled between a pad (at  $V_o$ ) and a first supply voltage; and a switch 32 coupled to the bulk of transistor 22. Fugate et al.'s figure 2 fails to show the detail of the switch 32. However, Zhu et al.'s figure 4 shows an integrated switch circuit (P3, P4, 102). It would have been obvious to one having ordinary skill in the art to use Zhu et al.'s integrated switch circuit for Fugate et al.'s switch 32 for the purpose of saving space. Thus, the modified Fugate et al.'s figure 2 further shows a first transistor (Zhu's P3) coupled between a bulk of the pull-up transistor and a source of the pullup transistor, and having a gate coupled to receive a control signal (output of 34); and a second transistor (Zhu's P4) coupled between a drain of the pullup transistor and the bulk of the pull-up transistor, and having a gate coupled to receive a complement of the control signal; wherein when the control signal is in a first state, the bulk of the pull-up transistor is coupled to the pad and when the control signal is in a second state, the bulk of the pull-up transistor is couple to the first



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supply voltage; and a drain-to-bulk diode of the pull-up transistor clamps a voltage received at the pad.

8. Claims 26, 28-31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Miyanaga et al. (USP 5514893) in view of Verhaege et al. (USP 6529359), Fugate et al. (USP 6525594) and Zhu et al. (USP 5933047).

As to claim 26, 28 and 29, the combination of Miyanaga et al. and Verhaege et al (see the rejection of claim 1) shows all elements of the claim except for a switch circuit coupled to the bulk of the pull-up transistor. However, the combination of Fugate et al. Zhu et al. (see the rejection of claim 27) shows a circuit having switch circuit (the modified 32 and 34) coupled to the bulk of pull-up transistor 22 in order to prevent sudden voltage drop at the bulk, thereby reducing output noise. Therefore, it would have been obvious to one having ordinary skill in the art to add the modified Zhu et al.'s switch circuit to Miyanaga et al.'s pull-up transistor 4 for the purpose of reducing output noise.

As to claim 30, the combination of the above references shows a hot-socket circuit (Zhu et al.'s 34) to provide the control signal, wherein the hot-socket circuit determines the higher voltage between the voltage on the pad and the first supply voltage.

As to claim 31, the combination of the above references fails to teach plurality of programmable logic elements. However, it would have been obvious to one having ordinary skill in the art to use the modified Miyanaga et al.'s circuit in a circuit comprising programmable logic elements in order to take advantage of the modified Miyanaga's benefit to the programmable logic elements circuit.

### ***Response to Arguments***

9. Applicant's arguments have been fully considered but they are not persuasive.

Applicant argues that the modified Miyanaga et al. reference fails to teach “a resistor having a first terminal coupled to the pad, and a second terminal coupled to receive an input signal”. The examiner respectfully disagrees. Since Verhaege et al.’s figure 1 is used to provide drive signal to Miyanaga et al.’s figure 1, Verhaege et al.’s node 36 must directly coupled to Miyanaga et al.’s node 1. Thus, Verhaege et al.’s resistor 38 is directly coupled to Miyanaga et al.’s pad 1. Verhaege et al.’s figure 1 further shows that the other terminal of resistor 38 receives input signal generated by transistors 12 and 14.

Applicant further shows that it is clear that if an input signal was to be received, it would be at the second terminal of Rout 38, since this pad is connected to a pad 36 that is labeled I/O. The examiner respectfully disagrees. It is known that I/O represent for input/output. Thus, terminal I/O can be used as input terminal or output terminal. In the modified Miyanaga et al., terminal I/O is used as output terminal.

Applicant further argues that the modified Miyanaga et al. reference fails to show an input buffer having an input directly connected to a pad. The examiner respectfully disagrees. The rejection considers Miyanaga et al.’s resistor 6 and inverter 7 as parts of “a buffer circuit”. It is clearly shown that the “buffer circuit” which comprises resistor 6 and inverter 7 having an input directly connected to the pad 1.

Applicant further argues that there is no motivation to combine the references in the rejection of claim 17. Applicant further states that it is not obvious to combine Sher’s switches with the protection circuit Toyashima. The examiner respectfully disagrees. Toyashima teaches using fuses as switches. Sher further teaches that transistors also can be used as switches. One skilled in the art would have motivated to use transistors for Toyashima’s switches in order to take the advantage of the transistor, such as the transistor switch is reversible while fuse switch is irreversible.

Applicant further argues that the references used in the rejection of claim 27 fails to disclose "when the control signal is in a second state, the bulk of the pull-up transistor is coupled to the first supply voltage, and a drain-to-bulk diode of the pull-up transistor clamps a voltage received at the pad." The examiner respectfully disagrees. It is known that the internal structure of PMOS transistors comprises two heavily doped p-type regions known as source and drain regions. The drain and source regions are created in an n-type substrate known as body or bulk region. Thus, internal diodes are created by the pn junction between the drain and body and the pn junction between the source and body (Text book). In the modified Fugate et al., when the body or bulk of PMOS transistor 22 connected to Vdd, the cathode of the internal diode created by the pn junction between the drain and the bulk is connected to Vdd, and the anode of the internal diode is at the drain. Therefore, the internal diode between the drain and bulk or the drain-to-bulk diode of transistor 22 clamps a voltage receives at the pad.

### ***Conclusion***

10. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Quan Tra whose telephone number is 571-272-1755. The examiner can normally be reached on 8:00 AM - 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy Callahan can be reached on 571-272-1740. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

A handwritten signature in black ink, appearing to read 'Quan Tra', with a long horizontal flourish extending to the right.

QUAN TRA  
PRIMARY EXAMINER  
ART UNIT 2816

January 24, 2007